McMaster University

Software Requirements Specification

VR Casino: Simulated Virtual Reality for modelling financial risks

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1: Purpose:

1.1: Document Purpose:

The purpose of this document is to provide a detailed overview of the virtual reality casino system.It will be used to explain the purpose of this system, the system interface, how the system will be used, the specific users of the system, the environment it will be used in, the behaviour of the system, and the limitations/rules of the system.

1.2: Definitions/Conventions

Term	Definition
VR	Virtual Reality (VR) is the use of computer technology to create a simulated experience that can be similar to or completely different from the real world.
Database	A software used to store user input results and user information.
Slot Machine	A single entity/object inside the virtual environment. It can be interacted with by users by engaging in a financial risk.

Environment	The environment encompasses the whole VR system for which the user can interact. It includes all the slot machines for which the user can interact.
Slot	A casino gambling machine that runs a game of chance for its customers.

1.3: System Overview:

The VR system consists of slot machines, each of which the user can interact with. The user may select any machine and bet an amount, thus engaging in financial risk. The user starts with a set number of coins, they may bet any amount up to a maximum of the amount of coins they have available to them. After selecting a bet amount on a machine the user then pulls a lever, located on the side of the machine, thus commencing the slot machine. Each slot in the machine is individually randomized and if the user gets three matching slots (as seen in the image below) then the user wins and is given a winning amount back relative to how much they bet. Otherwise the machine keeps the money and they lose. After every round of playing, the game results are then stored and saved in the database.

**Below is an image of a slot machine similar to our development to help give a visual aid of what an individual slot machine looks like:

Each slot in the machine is seen by the *7's* and the lever on the right is pulled to initiate the slot machine.

1.4: References

- Image Source:<u>https://www.gettyimages.ca/illustrations/slot-machine</u>

2: Overall Description:

2.1: Product Perspective:

The virtual reality casino is a simulation of a casino, in which the intent is to model how internal changes to the virtual environment can alter the willingness of users to engage in financial risk. By allowing changes to the virtual environment, the goal is to see how the users perception to engage in financial risk is altered. Changes to the environment can range from, but are not limited to, altering the lighting of the system, the color of the slot machine itself, providing audible feedback or music, and depth perception(distance between slot machines). The goal is to see how these environmental changes can alter the users willingness to engage in financial risk.

The environment itself consists of one or more slot machines, each with slightly different visual and audible components. Each of these machines provide different feedback to the user depending on which slot machine they choose. This is where these environmental changes mentioned above come into play. The individual machines are each slightly altered with different components that makes them unique.

**Refer to Section 3.2 for a more detailed example of these environmental changes

2.2: User Interface:

The virtual environment provides a way for users to interact with the slot machines. The user is able to engage in the environment by moving within the environment to a slot machine. By choosing to engage with any of the machines the user must provide a financial risk amount, to the said machine they wish to engage with, by inserting coins and then pulling a lever attached to that machine to begin the game.The machine selected by the user then provides feedback to the user indicating whether they have won or lost.

2.3: Hardware Interfaces:

- HTC VIVE VR Headset

2.4: Software Interface

The following are the software that will be used:

- Unity/C#

- Microsoft SQL Server

The database will save include participant information, actions along with time stamps and environment settings during game play.

All feedback from virtual reality casino will be stored in a secure database in Microsoft SQL Server. This will include participant ID and other input information provided by the participant. For data output, two data files will be created, Summary data and per frame data.

- Per Frame data:
  - This provides feedback of time stamps, actions, and environment parameters.
- Summary data:
  - This is an overview list of participant actions and environment parameters.

2.5: User characteristics:

2.5.1: Participants/Users:

- Participants are decided by researchers.
- This environment should be usable by anyone who is able to use and operate a HTC Vive and a computer running Windows 10 or later.

2.5.2: Researcher characteristics:

- Researchers must be able to operate a computer on Windows 10 or later.

2.6: Constraints, Assumptions, Dependencies:

2.6.1: Constraints:

User may select only one of the slot machines per round.

- Upon selecting a machine the user must bet an amount greater than zero but less than or equal to the amount of coins they have available to use. For example, if the user has 10 coins, they may select anywhere between 1-10 coins but no more or less.
- Once the lever is pulled it cannot be undone so the round commences.

2.6.2: Assumptions:

- It is assumed that users are good physical candidates for using VR equipment. This includes not having a history of motion sickness.

2.6.3: Dependencies:

- Lab space with video camera to allow the user to freely move around(while playing the VR game), and also recording user's physical movement.

3: Specific Requirements:

3.1: External Interface requirements:

The VR system is designed to be used with the Windows operating system, preferably windows 10 or later.

3.2: Functional Requirements:

- Coins can be purchased.

- User is able to enter coins into the slot machines.
- User is able to withdraw coins from the slot machines.
- User is able to convert coins to virtual money.
- Game can be played once coins are entered into the slot machine.
- User can see visual feedback after playing a round.
- User can hear sound feedback after playing a round.
- Environment elements can be modified.
- Environment background can be modified.
- More slot features like bonus rounds etc. (http://www.mrgamez.com/slot-features/)
- User can go from one machine to another to play different games.
- Win payoffs can be modified.
- Slot probabilities can be modified.

3.3: Performance Requirements:

The simulation's visual must run smoothly, without any latency, to keep the level of immersion high. This requirement is dependent on many aspects of the user pc.

Minimum requirements:

- Processor: Intel Core i5-4590 or AMD FX 8350
- Graphics Card: NVIDIA GTX 970 or AMD Radeon R9 290
- RAM: 4GB (Minimum)
- USB: One USB port A 2.0
- Operating System: Windows 7 or better
- Video Output: HDMI 1.4 or Display Port 1.2 (Only One required)

Recommended requirements:

- Processor: Intel Core i5-4590 or AMD FX 8350 (A better processor Recommended)
- Graphics card: NVIDIA GTX 1060 or AMD Radeon RX 480
- RAM: Minimum is 4GB, however, I would recommend to go with 8GB
- USB: One USB port A 2.0
- Operating System: Windows 8.1 or better
- Video Output: HDMI 1.4 or Display Port 1.2 (Only One required)

3.4: Logical Database Requirements:

- MS SQL Server

3.5: Software System Attributes:

Reliability/Availability:

- Database information must be ready and available for use by researchers.

Security:

- User information is stored in an external database, therefore database must be secure from external threats e.g:Hackers.

Portability:

- Device is usable with HTC Vive headset using unity 3D.

Usability:

- Immersive and interactive VR experience will be delivered to the user, where they can play slot games in a virtual casino through intuitive tasks.

3.6: Safety requirements:

- For safety reasons the HTC Vive requires that you have at least 2 meters of square area around you.
- Any obstacles inside this two meter area may cause obstruction when using the VR system, and it could possibly cause damage to the HTC Vive headset or user themselves.
- Please avoid using for a long period of time as it could cause headaches.